Lesson 3

Bell's vireo on nest

Animals That Blend with Their Background

In this lesson, students learn that traits that enable the species to survive and reproduce will be passed on. Students compare photographs of ermine and mule deer fawns shown against backgrounds that are first similar and then different from the animals' coloring. Students discuss how surviving to reach the reproductive stage is dependent on the physical and behavioral traits that represent an organism's adaptation to its environment.

Learning Objective

Provide examples of inherited characteristics that are influenced by the environment.

To understand how camouflage is an inherited trait influenced by the environment, students design an animal to be camouflaged against posters of woodlands in summer or in winter. How well their animals are camouflaged is tested by how quickly students from other groups can spot their creatures. Students have the opportunity to be the masterminds behind designing protective coloration. Because they want their creatures to survive the longest, without being observed by their classmates, students are motivated to discover the most successful camouflaging techniques, simulating natural camouflaging strategies.

Background

Camouflage is an inherited characteristic that is influenced by the environment. It is one form of protective coloring. The right combination of color and pattern can help a species hide from predators, increasing its chances for survival. Camouflage utilizes several mechanisms.

In one type of camouflage called cryptic resemblance, an animal's color is similar to its surroundings. For example, brown mule deer and brown ermine blend into a background of trees, fallen leaves, and earth. Coat color can change with the seasons, as in the case of the ermine. The molt of its brown coat in the fall and its white coat in the spring is triggered by a complex equation of three factors—shortening or lengthening hours of daylight, dropping or rising temperature, and the amount of snow cover. Other animals, such as the chameleon, change color quickly by changing pigmentation.

Countershading is another form of camouflage. When an animal of a uniform color is lit from above, the reflection of light casts shadows that alert predators to prey. When an animal's upper surface, which is usually exposed to the sun, is darker, and its lower surface, which is usually shaded, is lighter, light reflects unevenly. This reduces shadows on an animal's body, making it harder for a predator to see it. Both mule deer and ermine (in summer) have dark upper bodies and white bellies.

Mule deer fawns use disruptive coloration. Irregular patches like the fawns' white spots blend with light dappled through trees and with fallen leaves, rocks, and wildflowers. (This adaptation also works in some disrupted habitats such as orchards, parks, and golf courses.) Contrasting colors distract the eye away from an animal's outline. In the same way, the black tip of a white ermine's tail can increase its survival rate: predators may think the black point is an animal. If it is attacked there, the ermine has a better chance of getting away or surviving an injury to its less vital parts.

Key Vocabulary

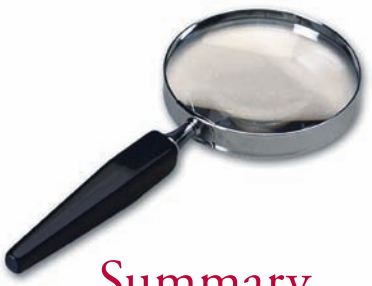
Environment: The surroundings of a living thing.

Molt: [verb] To shed skin, hair, or feathers before new growth.

Reproduction: The process a living thing goes through to create a baby plant or animal.

Camouflaged rabbit

Toolbox



Summary of Activities

Students compare photographs of ermine and mule deer fawns against similar and different-colored backgrounds and discuss how traits may influence an animal's survival depending on its habitat. In groups, they use camouflage techniques to hide and locate student-created animals in a winter or summer woodland habitat.

Instructional Support

See Unit Resources, page 24

Prerequisite Knowledge

Students should know about:

- animal life cycles, including reproduction.
- differences between animal life cycles.

Students should be able to:

- compare images.

Advanced Preparation

Gather and prepare Activity Masters.

Gather and prepare Materials Needed.

Gather and prepare Visual Aids:

- Prepare transparencies.
- Place the posters **Woodlands in Summer** and **Woodlands in Winter** in a central location on the wall.
- Gather from previous lessons:
  - **White Ermine in Snow and White Ermine After Early Snow Melt,** Visual Aid #1, from Lesson 1
  - **Mule Deer Fawn Hidden Under Tree and Without Tree or Grass Cover,** Visual Aid #2, from Lesson 1

Materials Needed

Activity supplies:

- Double-sided tape: one roll
- Butcher paper: two pieces larger than 11" x 17"

A-V equipment:

- Overhead or LCD projector, screen

Class supplies:

- Construction paper (white, green, and brown), crayons or colored pencils, rulers (one per group), scissors

Visual Aids

Posters:

- **Woodlands in Summer**, provided separately
- **Woodlands in Winter**, provided separately

Transparencies:

- **Brown Ermine in Woodland**, Visual Aid #4

Duration

Preparation Time
25 min.
Instructional Time
45 min.

Safety Notes

Use safety scissors.

Activity Masters in the Supporting Materials (SM)

Traits for Fitting into an Environment
SM, Page 14
One per student

Procedures

Vocabulary Development

Use the **Unit Dictionary** and the **Vocabulary Word Wall Cards** to introduce new words to students as appropriate. These documents are provided separately.

Step 1

Point to the first new Key Vocabulary word, "environment," and read it and its definition. Sweep your arm around the classroom, and tell students this is their school environment; they also have a home environment. Likewise, a plant or animal's surroundings make up its environment.

Point to and read the next word, "molt," and give its definition. Explain that ermine molt their brown coats so that their white winter coat can grow in, then molt again when spring comes.

Point to and read the last word, "reproduction," and give its definition. Explain that all plants and animals reproduce to create young of their own kind (for example, mule deer produce baby mule deer called fawns).

Step 2

Project the transparencies **Brown Ermine in Woodland** (Visual Aid #4), **White Ermine in Snow and White Ermine After Early Snow Melt** (Visual Aid #1).

Discuss how individual ermine that survive both summer and winter cycles of the year in their environment are most likely to produce offspring the following spring. Their adaptation—the ability to molt and change coat color at the time the snow cover changes—is a trait they can pass on to their offspring.

Step 3

Project the transparency of **Mule Deer Fawn Hidden Under Tree and Without Tree or Grass Cover** (Visual Aid #2).

Tell students that the fawns who survived their early, helpless stage to reproduce were more often the spotted ones. Since the spotted fawns seem to live longer and reproduce than those without spots, scientists explain that this a trait is passed on to future generations.

Ask students what they notice about the white spots in the two transparencies. Establish that the spots stand out in an area with fewer trees or less grass, and that they might attract the attention of predators to the fawn.

Step 4

Use the poster **Woodlands in Summer** to talk about the predominant colors (green and brown) in the summer woodland.

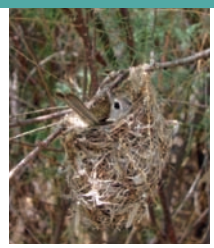
Use the poster **Woodlands in Winter** to talk about the predominance of white in the winter woodland.

Step 5

Organize students into groups of four. Distribute sheets of white, green, and brown construction paper and crayons or colored pencils to each group.

Tell students that they are going to have a "Camouflage Contest." Explain that each student is to design an animal that will blend into part of one of the large woodland scenes. Assign two students in each group to the summer woodland and two to the winter woodland. Direct students to choose the part of the poster they want their animal to blend into (for example, in a tree, under a tree, on the ground, in underbrush, in a hollow log). Within a group, no two students should create an animal for the same location.

Have students draw the animal's shape in pencil on one of the pieces of paper and cut out the shape. The shape can be that of a known or imaginary animal, its entire body or just the head.. The drawing should be no larger than two inches on a side. Let students discuss their options and choices as they work. Next, tell them to color spots, stripes, or other patterns onto their animal. (*Note: Allow 10 minutes for this process.*)



Step 6

Tell students in half of the groups to rest their heads on their desks. These students will be the "predators," searching for the hidden animals. Direct the students in the remaining half of the groups to tape their animals onto their target spots on the two posters. Then cover each poster with a large piece of butcher paper.

Divide the student "predators" into two groups, assigning one group to the **Woodlands in Summer** poster and the other to the **Woodlands in Winter** poster.

Remove the butcher paper and have students (still in their seats) search for the animals, pointing them out as soon as they see them. Identify the last animal to be detected on each poster, and declare the two student designers the winners of the round. Tell the students that their creatures' protective coloring trait did what it was supposed to do—protect the animal from being detected.

Repeat the process with the other half of the class.

Step 7

Distribute **Traits for Fitting into an Environment** (Lesson 3 Activity Master). Instruct students to answer the questions in their own words and in one or two complete sentences.

Collect **Traits for Fitting into an Environment** for assessment. After you have corrected them, hand them back to the students and review the answers together.

Lesson Assessment

Description

Lesson 3 teaches students that inherited characteristics or traits can be influenced by the environment. Class discussions in Steps 1 to 3 demonstrate student understanding of the relationship between some of an organism's inherited traits and the environment in which it lives. In Step 5, as they design animals that would be able to hide in a specific environment, students reveal their understanding that an animal's habitat can influence an organism's need to adapt. Completion of **Traits for Fitting into an Environment** (Lesson 3 Activity Master) demonstrates students' understanding of the role that the environment has in influencing characteristics that are passed onto future generations.

Suggested Scoring

Use the Answer Key provided on page 55 to score **Traits for Fitting into an Environment**. Answers should be presented in complete sentences. Each answer is worth five points for a total score of 20 points.

Answer Key and Sample Answers

Traits for Fitting into an Environment

Lesson 3 Activity Master

Name: _____

Short Answer: Answer these questions in complete sentences. (5 points each)

1. What helps a fawn survive?

Fawn have white spots on their backs. The spots look like sun coming through trees. When they hide near trees, they blend in.

2. How does an ermine blend in with snow?

In winter, ermine grow a white coat.

3. What is it called when an animal's colors make it hard to see?

It is called camouflage.

4. Why do traits get passed on?

The animal can survive to reproduce and have offspring.

4 **Brown Ermine in Woodland**
Visual Aid — Transparency

Brown Ermine in Woodland